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U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO. 1094

PROJECTILES AND WARHEAD FRAGMENTATION

24th Partial Report

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TESTS OF
ENERGA ANTI-TANK RIFLE GRENADES

FINAL Report

Task Assignment NPG-Re2c-35-1-53

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Tests of Energa Anti-Tank Rifle Grenades

PART A

SYNOPSIS

1. This test was conducted to determine lethal ranges of the nose, beam, and base fragments of the Energa anti-tank rifle grenade.

2. The maximum range for penetration of 0".040 dural by a fragment from a statically detonated Energa grenade is between 275 feet and 300 feet for the nose fragments, between 15 feet and 20 feet for the beam spray fragments, and between 20 feet and 30 feet for the base fragments.

Tests of Energa Anti-Tank Rifle Grenades

TABLE OF CONTENTS

Tests of Energa Anti-Tank Rifle Grenades

PART B

INTRODUCTION

1. AUTHORITY:

This test was authorized by reference (a) and conducted under Task Assignment NPG-Re2c-35-1-53, reference (b).

2. REFERENCES:

a. BUORD conf ltr S78-1(31) Re2c-JSM:rjb Ser 45688 of 6 October 1952
b. BUORD conf ltr NP9 Re2c-JSM:rjb Ser 42665 of 29 July 1952
c. Dept of the Army Technical Bulletin TB ORD 404 of 29 January 1951

3. BACKGROUND:

In association with the development of an aircraft launcher for the Energa anti-tank rifle grenade for the Marine Corps, the Bureau of Ordnance directed the Naval Proving Ground to conduct tests to determine the safety of airborne aircraft against the fragments of the grenade.

4. OBJECT OF TEST:

This test was conducted to determine the lethal fragment range of the nose, beam, and base fragments of the Energa anti-tank rifle grenade.

5. PERIOD OF TEST:

a.	Date Project Letter	6 October 1952
b.	Date Necessary Material Received	23 October 1952
c.	Date Commenced Test	3 December 1952
d.	Date Completed Test	4 December 1952

PART C

DETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

The Energa anti-tank rifle grenade, HE, AT, T-41, is a fin stabilized, point initiated, base-detonated, shaped charge grenade containing 0.73 lbs. of RDX and TNT and weighing a total of 1.42 lbs. Three (3) fuzing systems, contractors drawing numbers 2000i, 2000g, and 2000f1, were used in this test. Fuze assembly drawings are shown in Figures 1 and 2.

7. PROCEDURE:

Each grenade was set in a horizontal position on a 4' high wooden stand. Dural plates, 0.040 thick, were places at varying distances from the grenade to catch the nose (or jet) fragments (0°), the beam spray (90°) fragments and the base (180°) fragments. These plates (4' x 12') were placed sometimes horizontally and sometimes vertically and were moved to various distances until the limits of fragment penetration were obtained.

8. RESULTS AND DISCUSSION:

Twenty-eight (28) rounds of Energa anti-tank rifle grenades, HE, AT, T-41, were statically detonated to determine the maximum lethal range and minimum safety distance against 0.040 dural aluminum plate. Detailed penetration data are given in Table I. Some fragment penetrations were obtained from the nose (0°) spray at 275 feet distance, from the beam (90°) spray at 15 feet, and from the base (180°) spray at 20 feet. No penetrations were observed at 300 feet from the nose, at 20 feet from the beam, or at 30 feet from the base. Variations of the fuzing system did not affect the fragment penetration results.

PART D

CONCLUSIONS

9. The maximum range for penetration of 0.040 dural by a fragment from a statically detonated Energa grenade is between 275 feet and 300 feet for the nose fragments, between 15 feet and 20 feet for the beam spray fragments, and between 20 feet and 30 feet for the base fragments.

Tests of Energa Anti-Tank Rifle Grenades

The tests upon which this report is based were conducted by:
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NPG REPORT NO. 1094

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Twenty-fourth Partial Report

on

Projectiles and Warhead Fragmentation

- -

Final Report

on

Tests of Energa Anti-Tank Rifle Grenades

Project No.: NPG-Re2c-35-1-53
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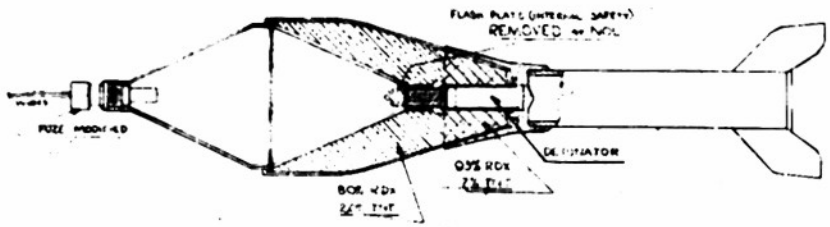
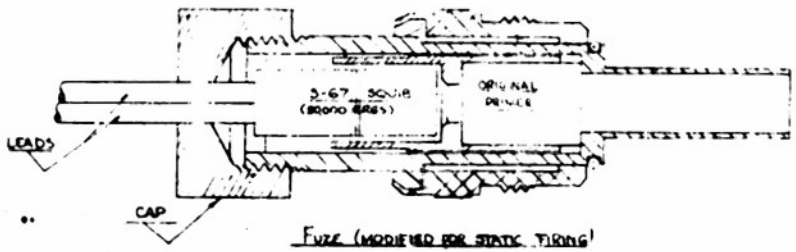


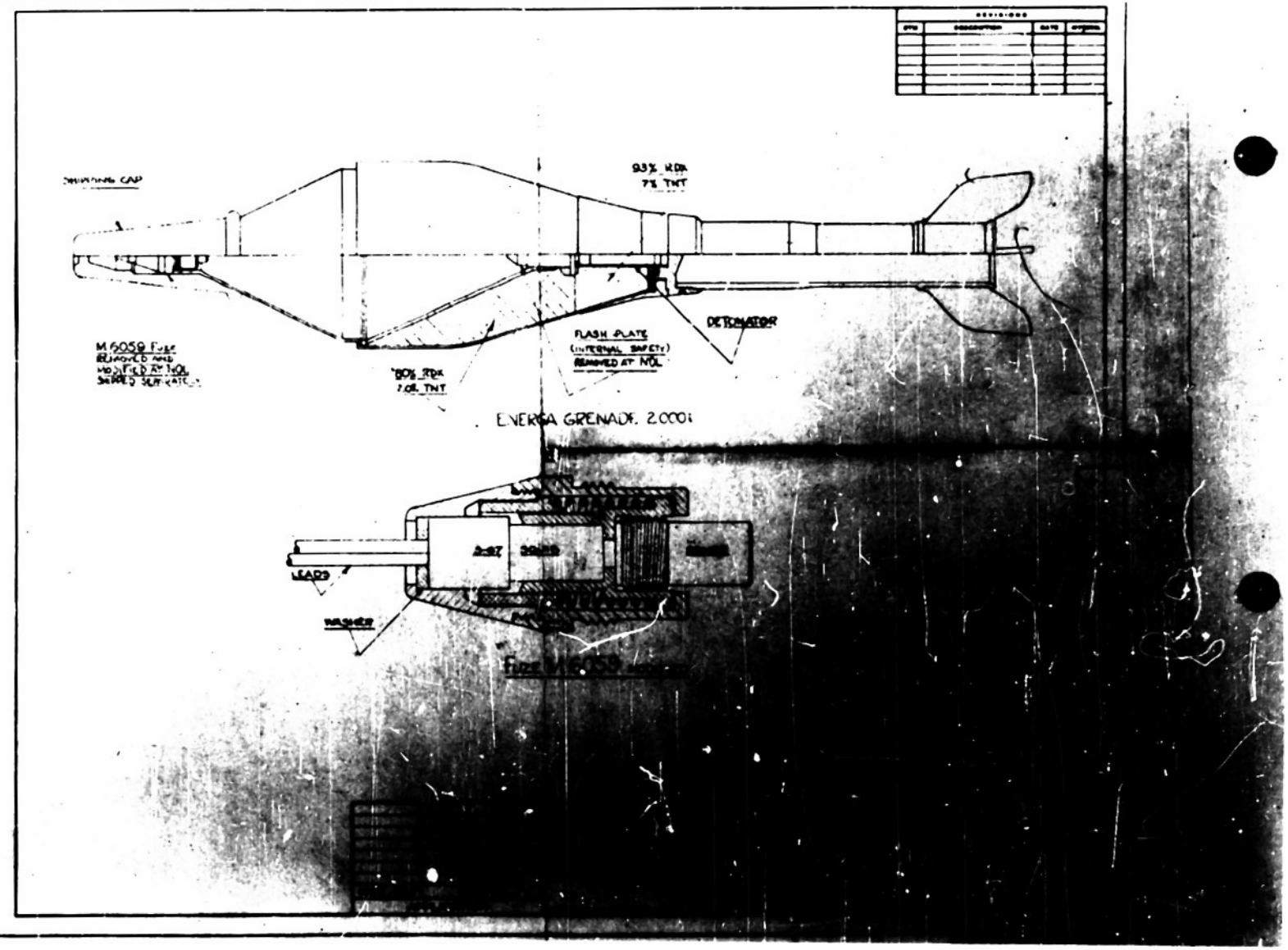
ENERGA GRENADE 2.000f$_1$
FRAGMENTATION TEST



FUZE (MODIFIED FOR STATIC FIRING)
GRENADE 2.000f$_1$

SK 355083

ENERGA GRENADE
2.000f$_1$


93% RDX
7% TNT
FLASH PLATE
(INTERNAL SAFETY)
REMOVED AT NOL
DETONATOR
80% RDX
20% TNT
LEADS
WASHER
ENERGA GRENADE 2.000
fuze M 209

Tests of Energa Anti-Tank Rifle Grenades

TABLE I

FRAGMENT PENETRATION DATA

Plate: OU040 Dural
Plate Height: 12' nose, 4' beam, 4' base
Plate Width: 8' nose, 12' beam, 12' base

	Nose (0°)		Beam (90°)		Base (180°)	
Fuze	Distance (feet)	No. Penetration	Distance (feet)	No. Penetration	Distance (feet)	No. Penetration
2000f1	* 50	3	15	0	10	2
"	* 30	30	10	10	15	2
"	* 40	35	15	2	15	2
"	* 60	--	15	2	** 30	0
"	- 60	7	15	1	** 40	0
"	- 80	10	15	2	40	0
"	- 100	8	15	0	40	0
"	100	12	15	3	30	0
"	100	9	15	3	30	0
"	100	30	10	28	30	0
"	200	7	10	30	30	0
"	200	7	10	30	30	0
"	300	0	20	0	30	0
"	300	0	20	0	30	0
"	300	0	20	0	20	1
"	300	0	20	0	20	0
"	300	0	20	0	20	0
"	275	0	20	0	20	0
"	275	2	20	0	20	0
"	275	1	20	0	20	2
"	275	1	20	0	20	0
"	275	1	20	0	20	0
2000g	275	1	15	1	15	9
2000i	275	0	15	1	15	5
2000g	300	0	20	0	20	0
2000i	300	0	20	0	20	0
2000g	300	0	20	0	20	0
2000i	300	0	20	0	20	0

* nose plate 12' wide by 4' high
\- nose plate 12' high by 4' wide
** base plate 12' high by 4' wide

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